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AUTHOR	Single, Peg Boyle; Muller, Carol B.
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ABSTRACT

Electronic mentoring (e-mentoring) programs are providing unprecedented opportunities for establishing mentoring relationships. E-mentoring is the merger of mentoring with electronic communications and links mentors with proteges independent of geography or scheduling constraints. In this case study, the authors apply a model of structured mentoring to the implementation of MentorNet (www.mentornet.net), a nationwide structured e-mentoring program for women engineering and science students, to identify issues related to the use of electronic communications as a delivery system for mentoring and to being the development of best practices for e-mentoring. The discussion covers the three phases of the model: (1) planning, including recruitment, managing expectations, and matching process; (2) structured implementation, including training, coaching, and community building; and (3) assessment, including involvement, formative evaluation, and summative evaluation. (Contains 11 references.) (Author/MES)

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When Email and Mentoring Unite: The Implementation of a Nationwide Electronic Mentoring Program

MentorNet, the National Electronic Industrial Mentoring Network for Women in Engineering and Science

Peg Boyle Single and Carol B. Muller

Electronic mentoring (e-mentoring) programs are providing unprecedented opportunities for establishing mentoring relationships. E-mentoring is the merger of mentoring with electronic communications and links mentors with protégés independent of geography or scheduling constraints. In this case study, the authors apply a model of structured mentoring to the implementation of MentorNet (www.mentornet.net), a nationwide structured e-mentoring program for women engineering and science students, to identify issues related to the use of electronic communications as a delivery system for mentoring and to begin the development of best practices for e-mentoring.

Introduction

Electronic mentoring (e-mentoring) is creating a revolution in mentoring that will continue and expand through the 21st century. By leveraging the growth in information technology, e-mentoring provides opportunities for mentoring that are prohibited by face-to-face mentoring programs. E-mentoring enables mentors and protégés otherwise constrained by time and geography to participate because e-mentoring programs connect participants through electronic communications, primarily email supplemented by Websites and electronic discussion lists. The reliance on electronic communications facilitates the development of mentoring relationships by allowing for the attenuation of status differences and the ease of thoughtful sharing. Also, e-mentoring programs provide unprecedented scalability;

This case was prepared to serve as a basis for discussion rather than to illustrate either effective or ineffective administrative and management practices.

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a core mentoring staff can service many more participants than would be feasible in face-to-face mentoring settings. Yet, the ease with which e-mentoring programs can be developed may belie the planning, administration, and resources required to make them successful. Because of the physical distance between program coordinators and participants, the temptation is great to match mentors with protégés but then provide little in the way of the coaching, training, and follow-up required to obtain a high rate of successful e-mentoring relationships.

In this case, the authors define e-mentoring and structured e-mentoring programs, identify their promise, and highlight some potential pitfalls. Then, using our experience developing and implementing MentorNet, a large-scale, nationwide structured e-mentoring program for women engineering and science students, we modify a model developed for conducting structured mentoring programs and apply this model to the e-mentoring format. Our hope is that practitioners involved in conducting e-mentoring programs benefit from our insights so that these programs will deliver the anticipated benefits. We realize, however, that too often important support programs, such as mentoring programs, operate with fewer resources than required. Under these circumstances, our desire is that the recommendations of this case will not prove burdensome but may help facilitate the most effective utilization of the available resources.

E-mentoring, Structured E-mentoring, and MentorNet

E-mentoring is the merger of mentoring with electronic communications and has also been termed telementoring, cybermentoring, or virtual mentoring. E-mentoring is defined as:

> a relationship that is established between a more senior individual (mentor) and a lesser skilled or experienced individual (protégé), primarily using electronic communications, and that is intended to develop and grow the skills, knowledge, confidence, and cultural understanding of the protégé to help him or her succeed, while also assisting in the development of the mentor.

Structured e-mentoring is defined as:

> e-mentoring that occurs within a formalized program environment, which provides training and coaching to increase the likelihood of engagement in the e-mentoring process, and relies on program evaluation to identify improvements for future programs and to determine the impact on the participants.

Advantages of E-mentoring

E-mentoring is made possible by the increased availability of electronic communications on college campuses, in the workplace, and in homes, schools, and libraries. Electronic communications provide a flexible communication environment independent of time and space, and allow for asynchronous exchanges, thus making them a useful medium for mentoring. While e-mentoring may not be an effective substitute for more time-intensive and personalized face-to-face mentoring, it can be quite useful in the absence of such mentoring opportunities. The flexible communication environment provides connections independent of geography and alleviates the need to schedule synchronous meeting times. Therefore, e-mentoring extends mentoring opportunities to many more protégés and allows mentors to participate who otherwise would find the time investment prohibitive (Muller, 1997).

E-mentoring also profits from the unique communication qualities associated with electronic communications. Electronic communications possess qualities that foster the development of open, supportive relationships. Electronic communications result in the attenuation of status differences by concealing social cues that otherwise hinder communication between higher status and lower status individuals (Sproull and Kiesler, 1992). In addition, communicating while using email allows for the construction of thoughtfully written messages without the pressure of immediately responding, as in oral communication.

Potential Drawbacks of E-mentoring Programs

E-mentoring holds much promise for human resource development, academic, preprofessional, and professional development. Amidst this promise, we offer a note of caution. Early in its establishment, and too often today, the face-to-face mentoring movement met with disappointing results. Mentoring programs were initiated with good intentions but without adequate planning and resources (Freedman, 1992). Mentoring programs failed as they matched mentors with protégés but provided little in the way of training, coaching, or follow-up. These mentoring programs too often fell short of the program goals and the expected benefits of mentoring. Practitioners and researchers quickly realized that training, coaching, and follow-up are required to extend the benefits of mentoring to a broader population of newcomers. Proper program structure and personnel improve participant involvement and increase the benefits associated with mentoring programs (Boyle and Boice, 1998; Murray, 1991).

Some qualities of electronic communications make it even more important to provide program structure for e-mentoring programs

than for face-to-face mentoring programs. The tendency to match pairs without having the necessary structure and follow-up in place will be as tempting in e-mentoring as it is in traditional mentoring, if not more so. By elaborating on the implementation of MentorNet, a structured e-mentoring program, we hope to spare e-mentoring some of the early failures experienced by the mentoring community.

MentorNet

MentorNet, www.mentornet.net, is a structured e-mentoring program that has been established since 1997 and uses e-mentoring to encourage retention and advancement for women students in the engineering and related science fields, where they are underrepresented, by matching them with industry professionals who serve as mentors. MentorNet is a nonprofit organization that relies on corporate, government, and campus partners to help recruit mentors and protégés and to provide funding and support for the program. MentorNet provided e-mentoring opportunities for 225 women students in engineering and science during its 1997-1998 pilot semester. MentorNet provided e-mentoring opportunities for 515 women students at 26 participating colleges and universities in 1998-1999, and for 1,250 women students at 36 participating colleges and universities in 1999-2000.

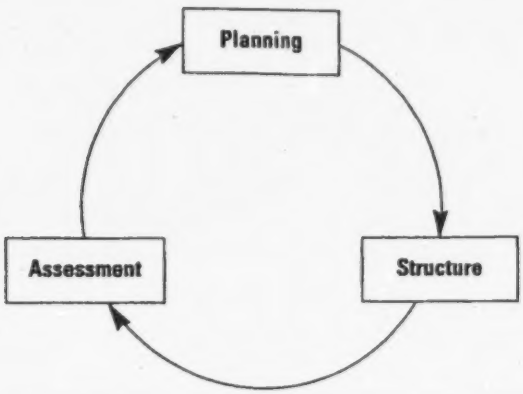
MentorNet and a Model of Structured Mentoring

To guide the discussion about MentorNet, we introduce a model of structured mentoring, which we apply to the implementation of MentorNet. This simple, iterative model, shown in figure 1, directs a mentoring program from inception, through implementation, to program evaluation. This model evolved from an earlier model developed for face-to-face mentoring programs (Boyle and Boice, 1998).

Planning

The planning phase begins the implementation of a structured e-mentoring program and spans from the time the program coordinator identifies the program population and goals through the introduction of the e-mentoring pairs. Planning lays the foundation that will aid in the success of the individual e-mentoring pairs, and thus, the e-mentoring program as a whole. The primary goal of the planning phase is to ensure that the participants and the e-mentoring pairs are aligned with the program goals and objectives. Thus, the development of clearly articulated goals and anticipated outcomes of the

Figure 1. Model of structured mentoring.



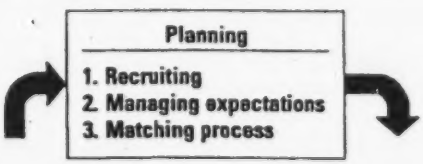
program is a prerequisite of the planning phase. The planning phase addresses recruiting, managing expectations, and the matching process, as shown in figure 2.

Recruitment

Recruitment is the process by which potential mentors and protégés are notified of the e-mentoring opportunity. Adequate planning strengthens recruitment by addressing when to recruit, how to recruit, and potential obstacles to recruiting the target mentor and protégé populations. Since MentorNet focuses on women engineering and related science undergraduate and graduate students, we conduct our mentoring program according to the academic year.

MentorNet relies on a host of partnering organizations to recruit mentors and protégés. Therefore, we have recruited program representatives who recruit within their organizations. The program representatives need to have access to the organizations' communication

Figure 2. The planning phase.



infrastructure and understand the organizational cultures, which will influence the recruiting techniques. Not surprisingly, we rely on electronic communications to recruit mentors and students. MentorNet creates recruiting materials, such as "Call for Mentors" email messages, "Call for Protégés" email messages, and posters, and makes them available to the representatives and on the program Website; our representatives have told us that strategically placed posters, brochures, and flyers can help in the recruitment process. In this way, MentorNet supports the program representatives and ensures greater uniformity in communications, thereby synchronizing the recruitment messages with the overall goals of the program.

The hub of any e-mentoring program is its Website. The recruitment process notifies potential participants of the opportunity and directs them to visit the program Website. MentorNet has developed online applications for potential mentors and protégés. The applications allow prospective participants to provide their names, main and alternative email addresses, and a phone number in case both email addresses are not working. Due to MentorNet's focuses on academic and career mentoring, the applications collect information about the students' academic program and career goals and about the mentors' educational and professional experiences. The application data are automatically converted to a database, alleviating the need for time-consuming and error-prone data entry.

Managing Expectations

Managing expectations includes communicating the program goals, eligibility criteria, and frequency of expected contact to the target mentor and protégé populations. Why are managing expectations so important? When participant expectations are aligned with program goals, face-to-face mentoring relationships meet more regularly and are rated as more successful (Boyle and Boice, 1998; Murray, 1991). As part of managing expectations, program coordinators need to clearly delineate the program requirements. For participation in MentorNet, the women students must be pursuing a technical or scientific career in industry or be interested in one, while the professionals must have a technical or scientific background. All participants must have regular access to email, be willing to exchange messages at least on a weekly basis for the full academic year, and participate in the program evaluation. In addition, MentorNet lets the participants know what they can expect from us: coaching messages every other week, monthly electronic newsletters, and availability to respond to their

concerns, questions, or suggestions. To ensure that prospective mentors and protégés read and agree to the expectations, MentorNet posts a set of participant guidelines on our Website; only after the applicants agree to the guidelines can they fill out the Web-based application.

Matching Process

The matching process will vary widely depending on the mentoring program format, target population, and goals. Since the match is the foundation of the e-mentoring relationship, careful consideration is given to the method by which e-mentors are paired with protégés. The matching process is even more important in e-mentoring settings than in face-to-face mentoring settings. Why? In face-to-face mentoring settings, particularly those focused on professional development, the participants usually share membership in an organization; therefore they already share a common setting and culture. In fact, a large part of the face-to-face mentoring relationship can be developed around helping the protégé understand the culture of a new organization. In contrast, e-mentoring may occur between mentors and protégés who share little, if any, organizational membership or inherently shared characteristics. Therefore, it is important to match carefully the e-mentoring pairs, since helping participants find common ground is important to getting the relationship off to a successful start.

There are three different methods for matching e-mentoring pairs. The first method, called Participant Choice, occurs when program administrators post biographical descriptions of mentors on a Website, then interested protégés can review the information associated with the mentors. To launch an e-mentoring pair, the interested party contacts the program coordinator, who forwards a message to the mentor whose biography was posted so as to share contact information and begin the e-mentoring relationship. A second method is Unidirectional Matching. In this instance and as part of the application process, typically the protégés identify preferences for a mentor. In this uni-directional preference-based matching protocol, the program coordinator matches protégés' preferences with mentors' characteristics and interests.

A final method is Bi-directional Matching and the method used by MentorNet. This method takes into account the interests and preferences of both the mentors and the protégés. With a small number of mentoring pairs, hand matching is feasible, and possibly most efficient. To perform a bi-directional preference-based matching protocol

for a large-sized e-mentoring program, however, we have developed a customized, automated matching computer program. This program incorporates a matching algorithm, developed based on MentorNet's goals and past evaluation reports. While this method is computationally intensive, it also provides a good exercise in making explicit the factors most important to the match and ultimately to the e-mentoring relationship. After the computer program identifies the initial matches, MentorNet staff reviews the matches before giving each party to an e-mentoring pair the other's contact information. If for any reason the program staff does not think a particular match will be successful, the pair are unmatched and placed back into their respective mentor or protégé pools and available for matching in the next matching round.

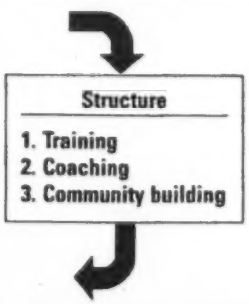
Structured Implementation

Structured implementation distinguishes structured mentoring programs. Structured implementation includes the training, coaching, and community building tasks that help participants make the most of the e-mentoring experience (see figure 3) and is influenced by the program goals and target populations.

Training

Training occurs at the beginning of the mentoring program and typically focuses on mentor training, although MentorNet strongly believes in and conducts protégé training. For e-mentoring programs, training focuses on introducing issues relevant to the target population and introducing general mentoring issues. One form of electronically supported training is the use of moderated discussion groups (Bennett, Hupert, Tsikalas, Meade, and Honey, 1998), likely to work best

Figure 3. The structured implementation phase.



with smaller-sized e-mentoring programs. In this type of training, members of a group of e-mentors (or protégés) are invited to subscribe to an electronic discussion group. Once everyone is subscribed, a moderator posts a case study and solicits responses from those on the list. The moderator periodically adds summary comments and questions that encourage additional discussion. After a designated time, the moderator posts another case study and continues facilitating the online training groups from a minimum of two weeks up through several weeks. MentorNet experimented with this method and concluded it was neither scalable nor the best use of existing technologies.

Another form of electronically supported training is a Web-based training tutorial that MentorNet is developing. This type of training is much more intensive to set up, yet is more scalable and recommended for large e-mentoring programs. Web-based training tutorials allow multiple mentoring participants to access the tutorials simultaneously and at their convenience. Such a tutorial introduces prospective mentors and protégés to appropriate case studies, then allows them to choose one of two or three possible responses. Next, they see an annotated response, which helps educate the participants about issues pertinent to e-mentoring and to women in engineering and science. In addition, the participants can view the responses of those who earlier went through the training tutorial; thus participants can also learn from the responses and suggestions of each other.

Coaching

Coaching is different from training. While training occurs at the onset of a program, coaching occurs throughout the program. Coaching, in a networked environment, is delivered via email messages containing discussion suggestions or mentoring tips that are appropriate for the program goals and population. The coaching messages are short email messages that are sent weekly or every other week. Separate messages are tailored for and sent to the mentor and protégé populations. MentorNet has developed various sets of coaching curricula, based on the educational level of the student being mentored. For instance, we have coaching messages customized for the first- and second-year women undergraduate students and their mentors. These messages focus on issues relating to adjustment to college and retention, since the early years see the highest attrition rates of women students in the engineering and science fields.

Coaching messages serve multiple purposes. First, they provide incentives for the mentors and protégés to stay in contact (Boice, 1992).

If the email exchanges have lagged, then the coaching prompts provide an opportunity to start up the exchanges again. Second, the coaching messages guide the e-mentoring pairs along the phases of the mentoring relationship, starting with initiation and moving through cultivation and separation to redefinition (Kram, 1983). Third, the coaching messages provide educational material to the participants and help broaden the scope of their interactions. Fourth, they allow the program coordinator to stay in contact with the mentors and the protégés. Keeping the lines of communication open allows the program coordinator to consult, to troubleshoot, and to rematch, as needed.

Community Building

An important part of conducting a mentoring program is to aid in the development of a sense of community among the participants. Program-sponsored opportunities for interactions among the program participants outside of the one-on-one mentoring relationship seem to increase involvement with the full program and with their organization or field as a whole. Participants have rated highly this program feature (Boyle and Boice, 1998). In addition, these program-sponsored opportunities enable participants to get additional ideas for discussion topics, allow mentors to give one another advice, and allow protégés the opportunity to get additional points of view.

How does an e-mentoring program foster community among its participants? By setting up electronic forums and electronic discussion lists that allow multiple participants to interact. To foster community among the MentorNet participants, we sponsor mailing lists, or electronic discussion groups, that allow the participation of multiple mentors and protégés. These electronic discussion groups allow protégés to interact electronically with other protégés and with mentors other than their one-on-one mentoring partner. In addition, we find that peer mentoring occurs among the mentors that subscribe and participate in the lists. We find that the most successful electronic discussion groups, those that evolve into electronic communities, are established around topics of direct interest to the MentorNet participants, have a sizable number of subscribers (at least 50), and include participants who served as informal moderators by posting questions, news articles with URLs, and topics, which help to seed and sustain the interactions (Single, Muller, Cunningham, and Single, 2000).

Assessment

For e-mentoring programs, the underlying principles and reasons for assessment remain the same as mentoring programs: to improve

and enhance the program features based on previous experience and to capture the benefits of the program for participants, to demonstrate the value of the program, and to justify the program to funders and funding agencies. Too often, programs focusing on human resource and student development go unassessed. The reasons are multiple: Assessment takes time, money, and expertise that may not be available to many mentoring and e-mentoring programs. Nonetheless, we think assessment is an important part in conducting an e-mentoring program, especially as e-mentoring is in its early states of development. Assessment is necessary to increase our understanding of the e-mentoring process and to identify best practices for the field.

MentorNet leverages electronic communications to facilitate data collection. There are at least two modes for collecting assessment data using electronic communications: email delivered or Web-based assessment instruments. Email delivered surveys can be difficult for respondents to read, largely because email systems have different formats. Email programs use different page widths that can cause questions to wrap in unintentional places that can confuse the meaning of the questions or the rating system associated with the questions. In addition, email delivered surveys require the program coordinator to engage in an additional data entry stage. By using Web-based surveys, MentorNet ensures that the formatting on the questionnaire will stay constant, depending only on the viewing size of any particular computer monitor. In addition, the surveys are linked directly to a database, so we do not have to engage in a time-consuming and error-prone data entry step.

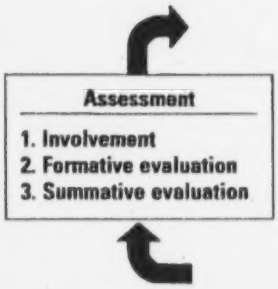
The method of delivering questionnaires and surveys is different for e-mentoring programs and mentoring programs, although the data collected and analysis of it are not necessarily all that different for e-mentoring or face-to-face mentoring programs. We recommend assessing involvement and conducting formative and summative evaluations, as shown in figure 4.

Involvement Data

Involvement data measure participants' involvement with the program and are defined as the frequency of interactions a mentoring pair has throughout the program. Assessment for involvement could be subsumed under either formative or summative evaluation, but since it plays an important role in the mentoring process, it warrants its own category.

At MentorNet, we want to know both how many email messages a pair exchanges per week and their assessment of that amount. The

Figure 4. The assessment phase.



assessment helps us to ascertain the expectations for the participants and whether it is the actual email messages exchanged or their satisfaction with the number of email messages exchanged that influences program satisfaction and benefits. In addition, we realize that alternative media for exchanging messages and information may help strengthen an e-mentoring relationship, so we ask the participants if they have met, spoken with their e-mentoring partner over the phone, exchanged Websites, and the like.

Nonetheless, and not surprisingly, the exchange of emails seems to be the one predictor variable associated with satisfaction and benefits from participation in MentorNet (Single, Muller, and Carlsen, 2000). We are in the process of ascertaining the predictor or program variables that foster regular and frequent email exchanges. The very nature of involvement, or the regular exchange of emails, currently leaves us in a quandary as to the direction of causality. Does an e-mentoring pair bond quickly and assess the value of the relationship and so exchange more email messages, or does the frequent and regular exchange of email messages cause an e-mentoring pair to be satisfied with their participation in the mentoring program and report benefits associated with participation? This remains a central question to address for MentorNet, and for the field as a whole.

Formative Evaluation

Unlike involvement assessment, which may be particular to mentoring or e-mentoring programs, formative evaluation is an important component for any intervention program. Formative evaluation results guide the alteration or enhancement of a program; the main audience for formative analyses is the program staff (Herman, Morris, and Fitz-Gibbon, 1987).

Formative evaluation helps the program facilitator to evaluate the program features and to improve them for subsequent programs. At MentorNet, we ask questions on our year-end survey that speak directly to formative evaluation. That is, we ask the participants to rate the different features of our program. We ask MentorNet participants to rate the matching process by rating the goodness of the match between themselves and their e-mentoring partners, to rate the usefulness of the Website, the coaching email messages, the newsletter, electronic discussion groups, and the program as a whole. If any feature is rated highly, then we can determine that it is successful and continue implementing this feature in its current rendition; if any feature is not highly rated, then we know that we need to look more closely at it in terms of the program goals and the participants' needs.

Summative Evaluation

Summative evaluation helps determine the value of the e-mentoring program and how well it achieved the program goals. Summative analyses address sustainability and expansion, with stakeholders as the primary audience (Herman, Morris, and Fitz-Gibbon, 1987). MentorNet's goals include addressing the underrepresentation of women in technical and scientific fields by increasing women students' awareness of career opportunities and knowledge of their fields, also by providing individualized support, with the expectation that these effects will increase retention and facilitate entry into technical and scientific careers. To assess these program goals, we employ year-end surveys and also longitudinal surveys, which follow a cohort of students over the five years following their participation in MentorNet. We ask questions about their experiences in MentorNet and their attitudes and plans for continued technical and scientific study or careers and so on. Like many social intervention programs, we recognize the value of using a control group design as a feature of our summative evaluation but are currently constrained from doing so by resource limitations and competing program goals.

Conclusion

E-mentoring provides a new medium for mentoring, allowing additional mentors and protégés to participate in mentoring programs where participation in a face-to-face program would be difficult or impossible. Unique qualities of electronic communications foster the development of mentoring relationships online. To maximize the benefits for participants in e-mentoring programs, we can build on the lessons learned from face-to-face mentoring programs.

Through our discussion of MentorNet, we presented a model of structured mentoring that guides the e-mentoring program process. The various phases of this model—planning, structured implementation, and assessment—identify issues to consider and address while developing and conducting e-mentoring programs. As e-mentoring continues to become increasingly popular, we hope the development of best practices and of programmatic frameworks, like those presented here, will help to propel the field forward.

Questions for Discussion

1. What are the advantages and disadvantages of conducting a structured face-to-face mentoring program compared with a structured e-mentoring program?
2. How would different program goals and target populations influence the matching criteria, the training modules, and the coaching curriculum?
3. MentorNet protégés appreciated having a mentor who was an impartial person, that is, someone with whom they could share their doubts and concerns but who did not have a vested interest in the outcomes of the protégés' decisions, unlike a parent or an advisor. How would conducting an e-mentoring program in a single organization or site influence this outcome of the mentoring relationship?
4. How would you persuade a senior manager or administrator to embrace and champion an e-mentoring program in your organization?
5. Would you think that e-mentoring would hasten the progression of the mentoring relationship through the stages of initiation and then moving through cultivation and separation and finally to redefinition? How would you develop curricula to support the progression?
6. Mentoring has been identified to provide information and psychosocial support, along with opening up opportunities for networking. How could you provide training and coaching to support these functions? How would this differ when conducting an e-mentoring program?

The Authors

Peg Boyle Single is the mentoring specialist and senior research associate for MentorNet. She has worked in the field of mentoring since 1993, conducting, researching, and writing about face-to-face mentoring, e-mentoring, and best practices for conducting structured mentoring programs. She earned a Ph.D. in social psychology from the State University of New York at Stony Brook. Single has published journal articles, delivered keynote and invited addresses, conducted mentor and

protégé training, and has made presentations at national conferences about mentoring, MentorNet, e-mentoring research, and best practices. She can be reached at 146 Loomis St., #2, Burlington, VT 05401; 802.862.4699; email: pboyle@email.sjsu.edu.

Carol B. Muller is the founder and executive director of MentorNet. She received her Ph.D. in education administration and policy analysis from Stanford University. Since 1987, she has worked in engineering and science education. As associate dean of Dartmouth's School of Engineering in the 1990s, she co-founded the campus' award-winning Women in Science Project, building on her expertise in gender issues in education and employment. She has authored numerous papers, is frequently an invited or keynote speaker at meetings and conferences, and has been awarded grants for her work from private foundations, corporations, the federal government, and others.

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